

PRELIMINARY DATA SUMMARY

July 1985

U.S. Army Engineer Waterways Experiment Station
Coastal Engineering Research Center
Field Research Facility
Duck, North Carolina

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CERC Field Research Facility
Duck, North Carolina

This report provides a summary of basic oceanographic, meteorological and bottom profile data for the month. The data were obtained as part of the Field Research Facility Measurement and Analysis Work Unit at the U.S. Army Engineer Waterways Experiment Station, Coastal Engineering Research Center's Field Research Facility in Duck, North Carolina. The data were collected and the analyses performed by the FRF staff. These summaries are intended to make the data readily available to all FRF users, and comments on their content and usefulness are invited.

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I. INTRODUCTION

The U.S. Army Engineer Waterways Experiment Station, Coastal Engineering Research Center's (CERC) Field Research Facility (FRF) is located on the Outer Banks of North Carolina, near the village of Duck (Fig.1).

The FRF research program provides a means for obtaining high-quality field data, particularly during storms, in support of the U.S. Army Corps of Engineers' coastal engineering research missions. The FRF consists of a 561-m (1,840 ft) long concrete research pier supported on 0.91 m (3 ft) diameter steel piles. The pier deck is 6.1 m (20 ft) wide, 7.74 m (25.4 ft) above mean sea level (MSL), and extends from behind the dunes to approximately the 7.6 m (25 ft) depth contour. In addition, a main building contains offices, an instrument repair shop, and a data acquisition room.

One of the responsibilities of the FRF research program is the collection, analysis and dissemination of data on local oceanographic and meteorological conditions. Bottom profiles along both sides of the pier and periodic bathymetric surveys are also performed.

This summary is intended to provide basic data as soon as possible after they are obtained. Most of the data are daily observations or the results of preliminary data analysis. In many instances, continuous analog records and more extensive analyses will be made available later by the CERC Coastal Engineering Information and Analysis Center (CEIAC).

Table 1 is a list of instruments used, their status during the month, and the data collection status. Figure 2 identifies the location of the instruments. The water depth at the wave gages and current meters vary and may best be determined from the information contained in Figure 8. Other installation information is contained in Table 1. All times unless otherwise specified are referenced to Eastern Standard Time (EST).

Section II presents the meteorological data; Sections III through VI, oceanographic data; Section VII, nearshore profiles and bathymetry; and Section VIII, if included, documents special events that occurred at the FRF during the month.

Questions and/or comments concerning the data may be directed to Mr. H. Carl Miller at (919) 261-3511.

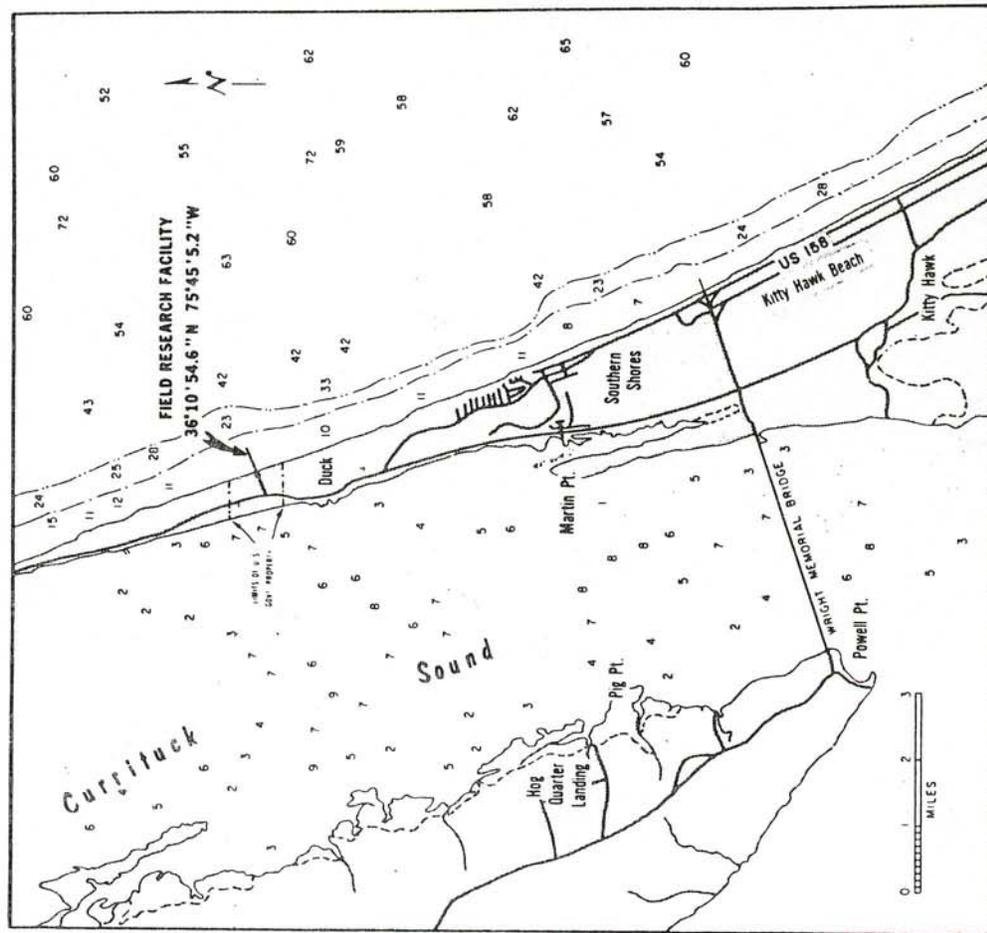
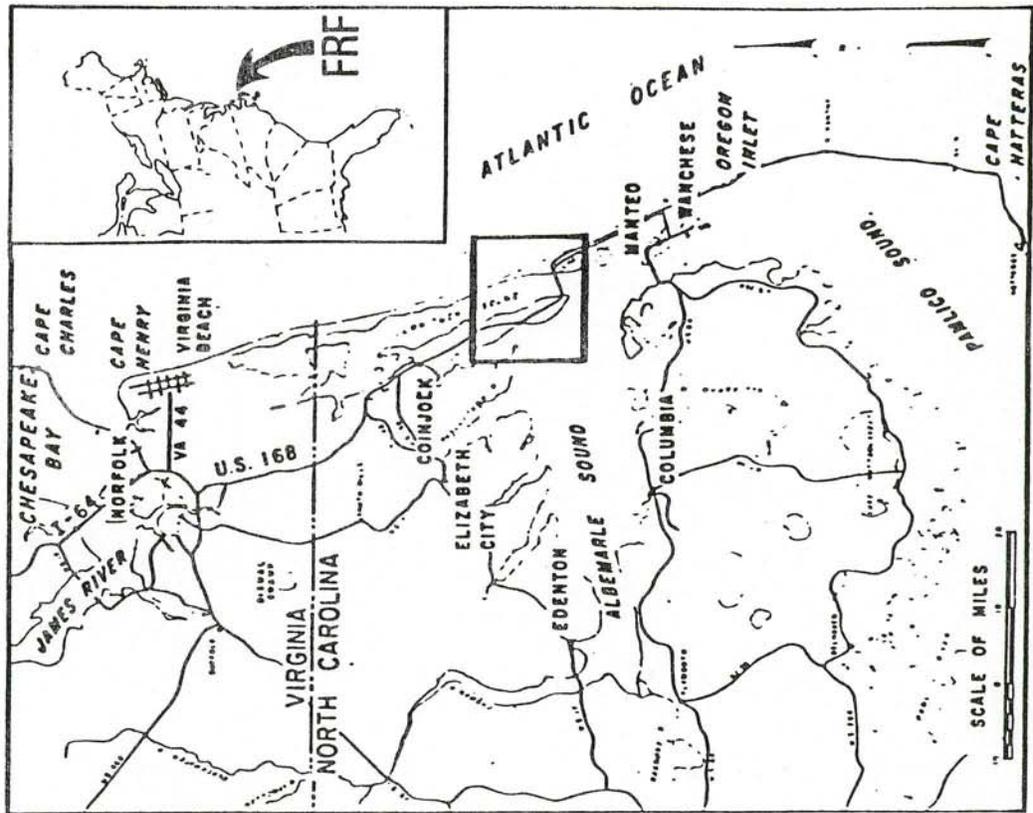
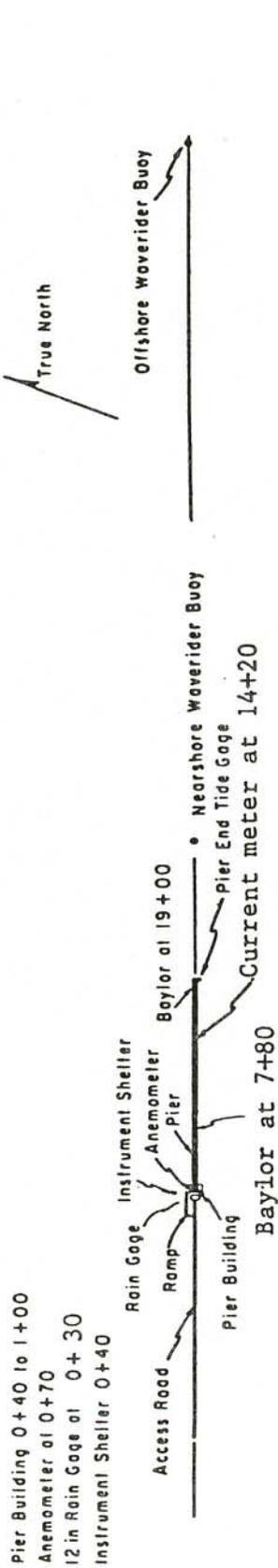


Figure 1. FRF Location Map



← Current meter 500m south of pier

CURRITUCK SOUND

ATLANTIC OCEAN

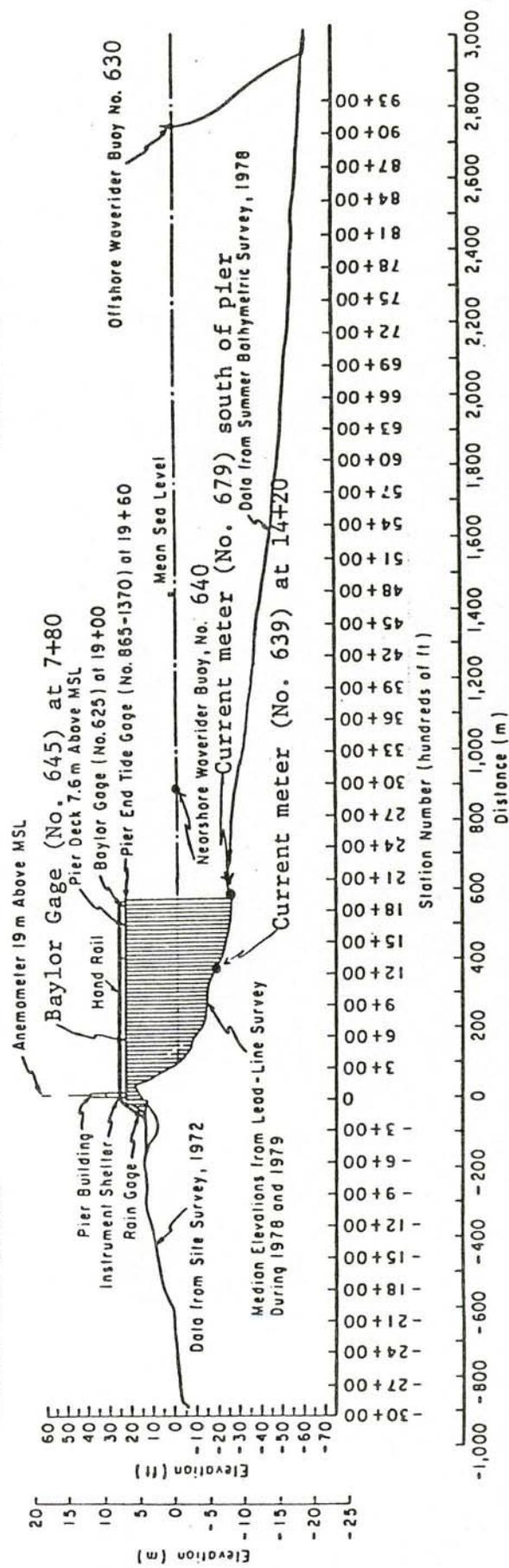


Figure 2. Instrument locations at FRF.

II. METEOROLOGICAL DATA

A variety of instruments have been installed at the FRF (Fig. 2) to monitor the meteorological conditions. The data presented in Table 2 are collected and stored on magnetic tape using a Data General NOVA-4 computer. For each instrument identified in Table 1 as having analog outputs, chart records are obtained, a log is maintained and the records are stored for future reference.

The wind measurements are obtained from a Weather Measure Skyvane located on the FRF laboratory building (Fig. 2), 19.1 m above mean sea level (MSL).

The high and low temperatures are obtained from daily readings of NWS maximum and minimum thermometers and represent the extreme temperature values since the last reading.

The following may be useful for converting the data in Table 2 to other frequently used units of measurement:

1. Millimeters (mm) to inches (in) -
 $\text{mm} \times .03937 = \text{in}$

2. Millibars (mb) to inches of mercury (in Hg) -
 $\text{mb} \times 0.02953 = \text{in Hg}$

3. Degrees Celcius ($^{\circ}\text{C}$) to degrees Fahrenheit ($^{\circ}\text{F}$) -
 $(^{\circ}\text{C} \times 9/5) + 32 = ^{\circ}\text{F}$

4. Meters per second (m/s) to knots (kn) -
 $\text{m/s} \times 1.943 = \text{kn}$

TABLE 2: METEOROLOGICAL DATA

PART 1

JULY 1985

DAY	HOUR	WIND SPEED (M/S)	WIND DIRECTION (DEG TN)	TEMPERATURE (DEG C)	ATM PRESSURE (MB)	PRECIPITATION (MM)
1	100	8	35	21.5	1016.9	0
	700	10	30	21.3	1017.2	5
	1300	11	18	20.2	1018.0	0
	1900	7	353	18.6	1018.4	0
2	100	2	323	19.0	1018.8	0
	700	1	36	20.3	1019.0	0
	1300	0		21.6	1016.1	0
	1900	0		22.1	1015.4	20
3	100	0		22.8	1015.6	0
	700	6	245	23.1	1015.6	0
	1300	4	248	28.2	1015.1	0
	1900	3	250	26.4	1013.5	0
4	100	4	219	23.9	1014.5	0
	700	5	225	24.3	1015.3	0
	1300	4	226	30.3	1014.8	0
	1900	5	186	26.9	1013.1	0
5	100	5	205	24.4	1015.0	0
	700	4	202	24.7	1015.7	0
	1300	6	147	25.5	1016.8	0
	1900	6	178	26.4	1015.1	0
6	100	6	220	25.2	1016.9	0
	700	6	220	25.1	1017.4	0
	1300	6	196	24.4	1017.9	0
	1900	6	204	25.7	1015.3	0
7	100	9	221	24.8	1015.8	0
	700	8	241	24.3	1015.7	0
	1300	5	246	28.1	1014.6	0
	1900	4	265	27.2	1014.0	0
8	100	5	296	24.0	1014.9	0
	700	4	273	24.1	1015.9	0
	1300	5	234	29.9	1014.5	0
	1900	5	212	28.1	1012.0	0
9	100	6	236	26.3	1011.8	0
	700	5	252	25.1	1011.3	0
	1300	4	230	30.5	1011.1	0
	1900	2	172	27.0	1009.4	0
10	100	3	173	25.8	1009.0	0
	700	2	204	26.2	1011.0	0
	1300	3	239	31.7	1011.3	0
	1900	7	166	24.4	1010.6	0
11	100	4	259	21.7	1012.4	0
	700	7	214	22.9	1013.3	11
	1300	4	226	27.7	1014.3	0
	1900	3	59	24.5	1014.8	0
12	100	2	90	23.2	1016.2	0
	700	3	287	25.3	1016.2	0
	1300	2	66	27.5	1017.3	0
	1900	4	247	24.6	1016.0	0
13	100	3	220	24.4	1017.5	0
	700	2	231	25.5	1018.6	0
	1300	5	131	29.6	1019.8	0
	1900	4	201	27.4	1018.9	0
14	100	4	199	25.6	1019.9	0
	700				1018.8	0
	1300				1017.8	0
	1900				1016.1	0
15	100		Software Crash		1015.1	0
	700	4	225	25.8	1016.1	0
	1300	3	150	31.4	1014.8	0
	1900	6	186	27.4	1012.4	0
16	100	6	204	25.9	1012.9	0
	700	4	216	26.1	1013.9	0
	1300	5	172	28.1	1013.1	0
	1900	2	183	26.1	1014.0	0

TABLE 2: METEOROLOGICAL DATA

PART 2

JULY 1985

DAY	HOUR	WIND SPEED (M/S)	WIND DIRECTION (DEG TN)	TEMPERATURE (DEG C)	ATM PRESSURE (MB)	PRECIPITATION (MM)
17	100	1	0	22.7	1013.8	0
	700	7	347	22.6	1014.1	0
	1300	7	29	25.6	1015.3	0
	1900	7	13	23.2	1015.8	0
18	100	8	16	22.7	1016.1	0
	700	8	14	23.5	1016.7	0
	1300	9	24	25.1	1017.9	0
	1900	8	27	23.5	1018.1	0
19	100	6	29	23.1	1018.9	0
	700	5	9	24.0	1019.7	0
	1300	5	27	25.7	1020.6	0
	1900	4	113	24.0	1018.7	0
20	100	5	201	24.2	1018.1	0
	700	6	227	24.7	1017.9	0
	1300	7	240	30.4	1016.3	0
	1900	5	191	27.9	1014.9	0
21	100	7	227	25.9	1015.1	0
	700	6	226	26.0	1014.8	0
	1300	4	221	32.0	1013.6	0
	1900	6	194	29.0	1011.9	0
22	100	9	225	26.0	1012.8	0
	700	8	235	26.0	1012.9	0
	1300	5	239	31.8	1012.0	0
	1900	6	224	24.7	1011.4	0
23	100	4	245	25.0	1011.8	0
	700	5	277	23.9	1012.8	0
	1300	8	26	24.3	1015.2	0
	1900	8	41	22.9	1016.3	0
24	100	8	60	22.9	1019.5	0
	700	9	60	23.3	1020.3	0
	1300	9	37	24.2	1021.7	0
	1900	3	78	24.2	1021.1	0
25	100	4	103	23.9	1022.3	0
	700	4	144	24.8	1022.1	0
	1300	7	162	28.3	1022.0	0
	1900	5	175	26.6	1020.8	0
26	100	4	189	25.9	1020.4	0
	700	6	214	26.3	1019.8	0
	1300	7	206	30.5	1017.9	0
	1900	7	202	27.4	1015.7	0
27	100	8	215	25.6	1015.6	0
	700	8	230	25.5	1015.7	0
	1300	5	243	30.3	1015.4	4
	1900	4	208	23.6	1015.8	0
28	100	4	249	23.5	1016.3	0
	700	0		22.8	1017.4	0
	1300	6	218	22.5	1018.3	28
	1900	2	132	22.7	1018.4	0
29	100	3	159	22.5	1019.4	0
	700	4	214	23.6	1019.4	0
	1300	3	217	25.5	1019.9	0
	1900	2	163	22.6	1019.5	4
30	100	4	223	23.2	1019.5	0
	700	3	222	24.0	1019.5	0
	1300	4	93	27.7	1019.5	0
	1900	4	134	25.1	1018.0	0
31	100	4	213	25.4	1018.5	0
	700	4	228	25.4	1017.8	0
	1300	3	136	29.5	1015.9	0
	1900	5	212	26.4	1012.9	0

III. WAVE DATA

Wave data were collected from two Baylor staff gages (CERC gage Nos. 625 and 645) and Waverider buoys (CERC gage Nos. 630 and 640, Table I and Figure 2). The data were collected, analyzed, and stored on magnetic tape using a Data General NOVA-4 computer.

The NOVA-4 is programmed to sample the wave gages every 6 hours near 0100, 0700, 1300, and 1900 EST at a sampling rate of four times per second, collecting data in 20-minute records.

Wave height (H_{m0}) is an energy-based statistic equal to four times the standard deviation of the sea surface elevations. The wave period is identified from the computation of a variance (energy) spectrum using a Fast Fourier Transform of 4096 data points (1024 sec). The period (T_p) is that associated with the maximum energy density in the spectrum. When this analysis is complete, the data are written to magnetic tape and entered into the CERC data base.

Table 3 presents the wave heights and periods for each wave record obtained during the month. The monthly means shown in Table 3 are an average of the values computed for all data records collected. The monthly standard deviations are standard deviations from the monthly mean of values for each record.

Figure 3 is a time history of the H_{m0} and T_p values for the Waverider 6 km from shore (630) and the Baylor gage at pier station 19+00 (625).

Differences in wave periods between wave gages (Table 4 and Figure 3) may be due to wave breaking or reformation, or the presence of multiple wave trains containing nearly equal energy.

TABLE 3: WAVE DATA

PART 1

JULY 1985

GAGE	DAY	TIME	645		625		640		630	
			Baylor Hmo(m)	at 7+80 T(sec)	Baylor Hmo(m)	at 19+00 T(sec)	Nearshr Hmo(m)	Wvrdr T(sec)	Farshr Hmo(m)	Wvrdr T(sec)
1	1	1	1.30	8.06	1.55	7.42	1.47	6.87	1.70	7.42
		7	1.09	6.87	1.64	6.87	1.88	8.06	1.82	8.06
		13	1.22	5.02	1.82	8.06	1.70	7.42	2.08	5.63
		19	1.14	5.99	1.63	6.87	1.73	6.40	2.06	8.06
2	1	1	.96	8.06	1.70	8.06	1.66	8.06	1.66	7.42
		7	.65	6.87	1.03	9.75	1.08	7.42	1.33	5.31
		13	.51	5.99	.75	8.83	.72	8.06	.78	8.83
		19	.42	7.42	.68	7.42	.66	7.42	.80	7.42
3	1	1	.35	14.22	.51	8.06	.51	7.42	.64	8.83
		7	.32	8.83	.43	14.22	.49	12.34	.59	9.75
		13	.37	9.75	.52	9.75	.49	9.75	.55	9.75
		19	.49	8.83	.55	9.75	.59	8.83	.67	9.75
4	1	1	.52	9.75	.53	9.75	.57	8.83	.60	8.83
		7	.16	9.75	.36	8.83	.45	9.75	.55	9.75
		13	.51	5.63	.45	9.75	.50	8.83	.56	9.75
		19	.37	9.75	.52	9.75	.58	9.75	.81	8.83
5	1	1	.26	9.75	.41	9.75	.45	14.22	.57	8.83
		7	.24	9.75	.41	9.75	.44	9.75	.57	14.22
		13	.34	9.75	.51	9.75	.49	14.22	.72	14.22
		19	.39	5.63	.50	14.22	.46	14.22	.61	4.13
6	1	1	.31	14.22	.40	14.22	.44	14.22	.55	14.22
		7	.42	5.63	.42	12.34	.41	12.34	.55	5.99
		13	.24	5.63	.41	8.06	.46	14.22	.58	14.22
		19	.34	12.34	.40	12.34	.39	12.34	.53	12.34
7	1	1	.22	5.63	.37	12.34	.38	14.22	.59	5.02
		7	.26	12.34	.35	12.34	.33	14.22	.52	12.34
		13	.28	12.34	.27	12.34	.30	12.34	.41	12.34
		19	.22	12.34	.32	12.34	.35	10.89	.46	12.34
8	1	1	.22	12.34	.33	10.89	.34	12.34	.43	12.34
		7	.23	5.99	.31	10.89	.31	12.34	.35	12.34
		13	.14	6.40	.27	10.89	.28	12.34	.35	12.34
		19	.22	10.89	.36	12.34	.33	12.34	.44	12.34
9	1	1	.17	10.89	.27	12.34	.30	12.34	.44	12.34
		7	.17	10.89	.24	9.75	.24	8.83	.33	10.89
		13	.15	5.31	.25	12.34	.27	10.89	.30	12.34
		19	.19	5.02	.28	10.89	.27	10.89	.29	9.75
10	1	1	.15	12.34	.22	12.34	.27	10.89	.31	7.42
		7	.19	5.63	.30	5.02	.30	12.34	.42	4.53
		13	.27	5.02	.33	4.13	.35	10.89	.43	5.02
		19	.51	3.38	.62	3.51	.68	3.26	.79	3.38
11	1	1	.29	5.63	.35	9.75	.37	8.83	.59	8.06
		7	.38	2.78	.46	9.75	.43	8.06	.53	2.86
		13	*		.32	8.83	.34	9.75	.39	8.83
		19	.24	8.83	.37	8.83	.40	8.83	.46	8.83
12	1	1	.27	8.06	.35	8.83	.35	8.83	.41	8.06
		7	.31	5.31	.39	8.83	.43	8.06	.54	5.99
		13	.24	6.87	.37	8.06	.42	7.42	.47	7.42
		19	.28	7.42	.41	7.42	.42	7.42	.51	7.42
13	1	1	.29	4.53	.38	8.06	.41	7.42	.45	5.99
		7	.23	7.42	.31	7.42	.41	8.06	.45	8.06
		13	.28	6.87	.44	7.42	.43	7.42	.45	8.06
		19	.28	6.40	.42	6.87	.47	6.87	.48	7.42
14	1	1	.29	5.31	.39	6.87	.36	8.06	.47	8.06
		7								
		13								
		19		Software Crash						
15	1	1								
		7	.26	10.89	.32	9.75	.32	10.89	.39	10.89
		13	*		.32	10.89	.32	9.75	.44	9.75
		19	.38	9.75	.39	10.89	.38	9.75	.52	9.75
16	1	1	.33	9.75	.38	8.83	.36	9.75	.40	9.75
		7	.27	7.42	.32	9.75	.34	10.89	.38	7.42
		13	.44	5.63	.46	9.75	.42	9.75	.47	6.87
		19	.36	9.75	.38	7.42	.39	9.75	.47	9.75

*=Electronic problems

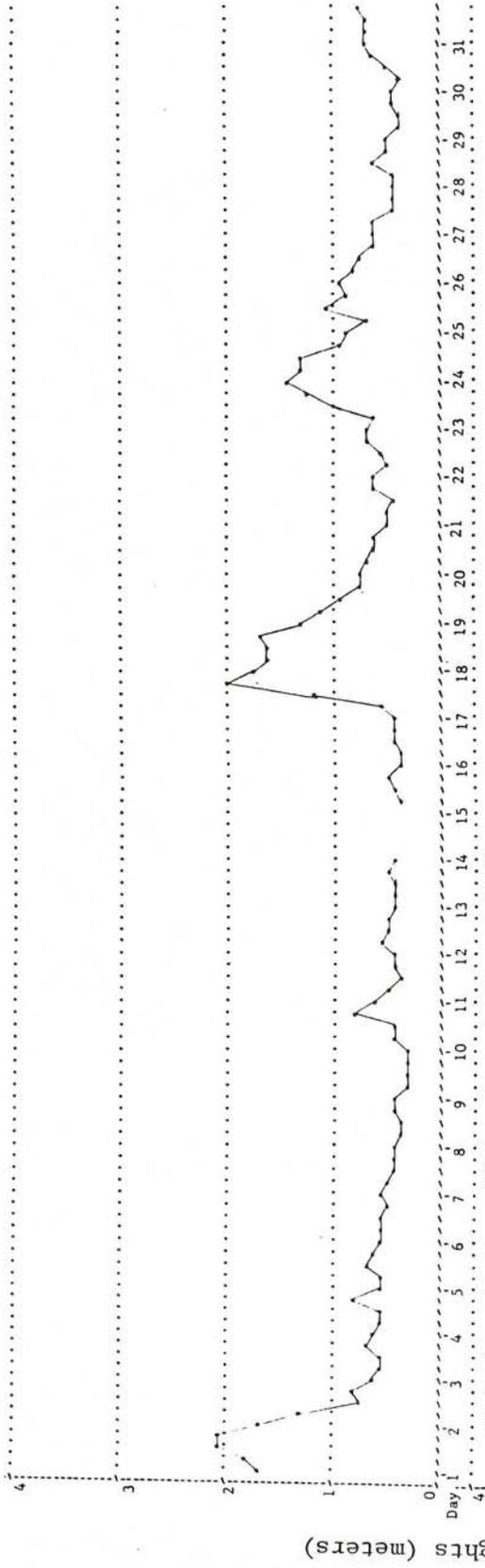
TABLE 3: WAVE DATA

PART 2

JULY 1985

GAGE	DAY	TIME	645		625		640		630	
			Baylor Hmo(m)	at 7+80 T(sec)	Baylor Hmo(m)	at 19+00 T(sec)	Nearshr Hmo(m)	Wvrdr T(sec)	Farshr Hmo(m)	Wvrdr T(sec)
	17	1	.41	5.99	.46	7.42	.40	9.75	.46	8.06
		7	.47	10.89	.49	10.89	.58	10.89	.58	9.75
		13	1.14	10.89	1.24	12.34	1.23	10.89	1.21	9.75
		19	1.18	5.99	1.32	5.99	1.51	9.75	1.99	5.63
	18	1	1.11	5.63	1.35	6.87	1.32	10.89	1.74	5.63
		7	.92	10.89	1.31	9.75	1.34	9.75	1.61	6.40
		13	1.02	5.63	1.45	9.75	1.38	5.31	1.61	5.02
		19	.98	5.31	1.38	6.40	1.45	6.40	1.66	5.99
	19	1	.74	5.31	1.11	5.99	1.07	8.83	1.33	5.31
		7	.59	8.06	.92	9.75	.92	9.75	1.15	8.06
		13	.52	8.06	.87	6.87	.83	8.06	.91	7.42
		19	.43	7.42	.68	8.06	.75	7.42	.74	6.40
	20	1	.45	6.40	.61	6.40	.59	6.87	.75	6.87
		7	.38	8.06	.55	9.75	.54	9.75	.70	6.87
		13	.39	6.87	.54	7.42	.48	7.42	.64	7.42
		19	.46	7.42	.48	6.87	.57	7.42	.65	8.06
	21	1	.34	6.40	.39	8.83	.36	7.42	.53	6.87
		7	.26	7.42	.29	6.40	.33	6.87	.48	6.87
		13	.26	6.40	.33	6.87	.32	6.87	.44	6.87
		19	.35	6.40	.41	16.79	.40	7.42	.63	6.40
	22	1	.26	5.63	.34	16.79	.29	7.42	.63	2.55
		7	.28	5.99	.32	14.22	.33	14.22	.52	9.75
		13	.31	8.83	.35	9.75	.39	16.79	.56	9.75
		19	.42	8.83	.46	8.83	.45	8.06	.70	8.83
	23	1	.40	9.75	.51	8.83	.51	9.75	.69	9.75
		7	.41	14.22	.50	9.75	.47	14.22	.63	8.83
		13	.76	4.32	.93	4.32	1.03	4.53	1.02	4.13
		19	.99	4.76	1.15	5.31	1.18	5.63	1.26	4.76
	24	1	.94	6.40	1.13	5.63	1.23	6.87	1.41	6.40
		7	.94	5.63	1.33	4.76	1.32	5.63	1.33	5.63
		13	.84	5.02	1.18	5.63	1.20	4.76	1.30	5.31
		19	.60	5.63	.94	5.99	.84	5.31	.96	8.83
	25	1	.43	5.02	.71	12.34	.72	7.42	.86	12.34
		7	.57	10.89	.72	12.34	.71	12.34	.70	12.34
		13	.69	4.13	.89	4.13	.96	12.34	1.04	3.38
		19	.66	5.31	.80	5.02	.77	9.75	.86	5.31
	26	1	.59	5.63	.66	12.34	.71	10.89	.93	5.63
		7	.54	5.63	.59	10.89	.56	10.89	.79	10.89
		13	.39	10.89	.46	10.89	.47	12.34	.73	4.76
		19	.43	12.34	.52	12.34	.46	9.75	.63	9.75
	27	1	.33	10.89	.42	10.89	.40	12.34	.64	10.89
		7	.36	5.31	.41	10.89	.39	10.89	.60	10.89
		13	.28	5.99	.35	10.89	.36	10.89	.46	8.06
		19	.26	12.34	.31	10.89	.34	10.89	.43	10.89
	28	1	.24	10.89	.29	10.89	.31	10.89	.42	9.75
		7	.26	6.87	.35	9.75	.39	10.89	.47	10.89
		13	.34	5.31	.47	4.76	.45	9.75	.65	10.89
		19	.29	5.02	.36	4.13	.42	10.89	.49	4.13
	29	1	.36	6.40	.47	5.02	.43	4.13	.50	5.02
		7	.22	5.31	.31	4.76	.33	10.89	.39	9.75
		13	.25	7.42	.36	7.42	.37	9.75	.39	6.87
		19	.28	8.06	.33	7.42	.38	7.42	.43	8.06
	30	1	.31	8.06	.36	8.83	.36	8.06	.43	8.06
		7	.29	8.83	.34	10.89	.38	8.83	.40	8.06
		13	.38	6.40	.46	8.83	.41	8.83	.49	8.83
		19	.48	6.87	.49	9.75	.55	9.75	.62	9.75
	31	1	.41	8.83	.62	9.75	.68	9.75	.69	9.75
		7	.46	9.75	.52	9.75	.64	9.75	.69	9.75
		13	.46	9.75	.67	9.75	.62	8.83	.71	8.83
		19	.54	9.75	.65	8.83	.69	9.75	.77	9.75
		MEAN	.45	7.77	.58	9.13	.60	9.56	.72	8.38
		STD	.27	2.55	.36	2.65	.37	2.48	.40	2.60

CERC Gage Number 630, Waverider 6 km from shore



CERC Gage Number 625, pier station 19+00

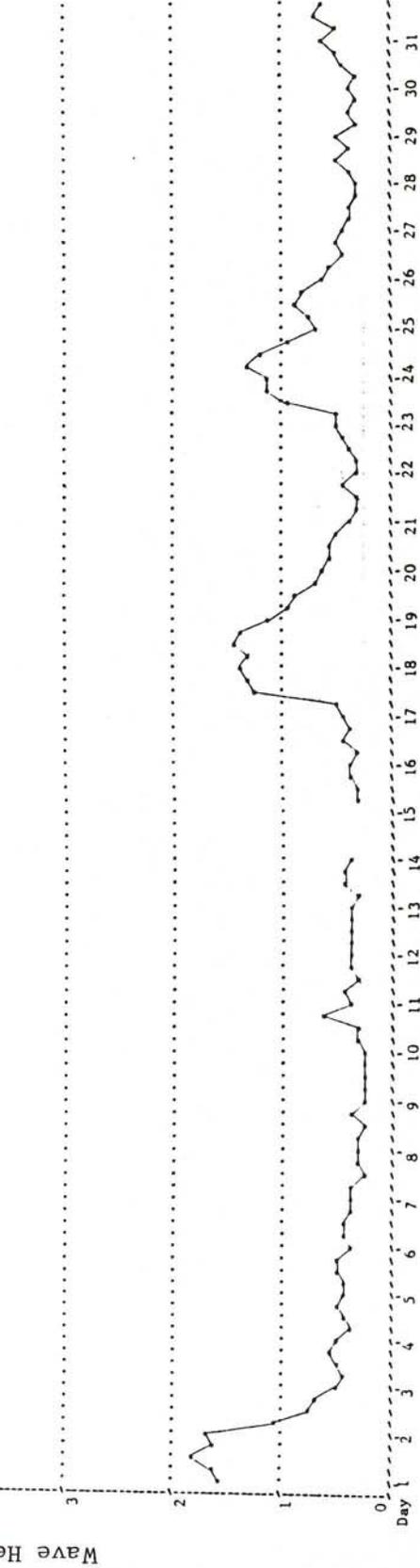
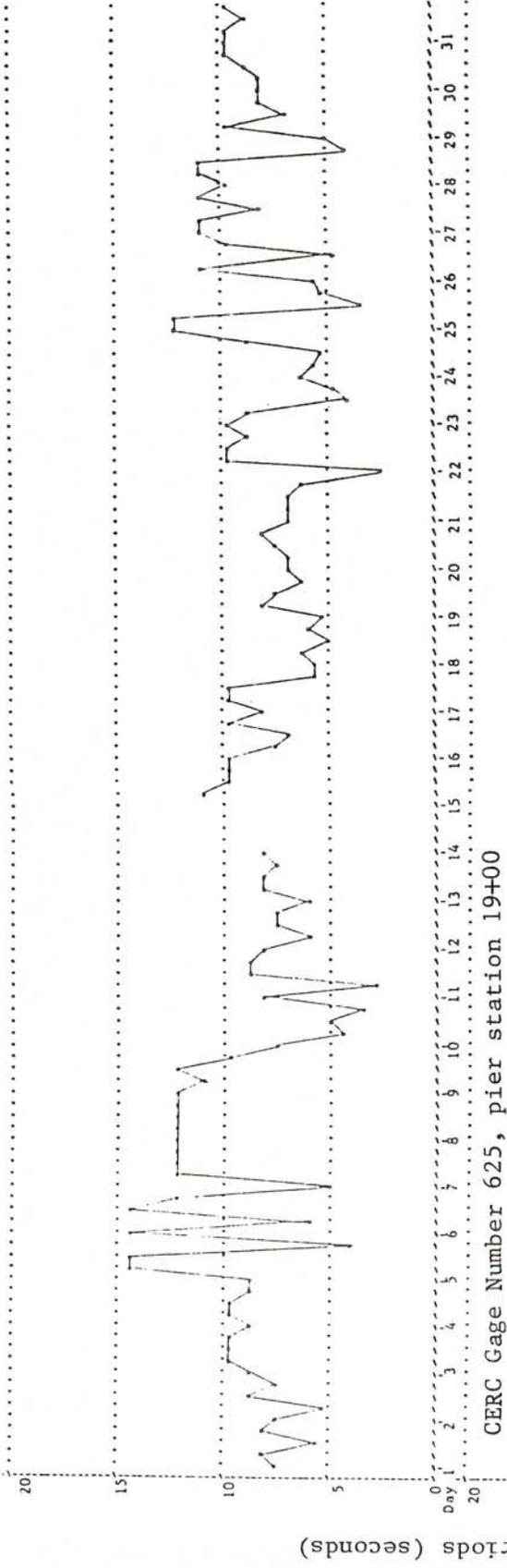


FIGURE 3. Time History of Wave Heights and Periods - July 1985 Part I: Heights

CERC Gage Number 630, Waverider 6 km from shore



CERC Gage Number 625, pier station 19+00

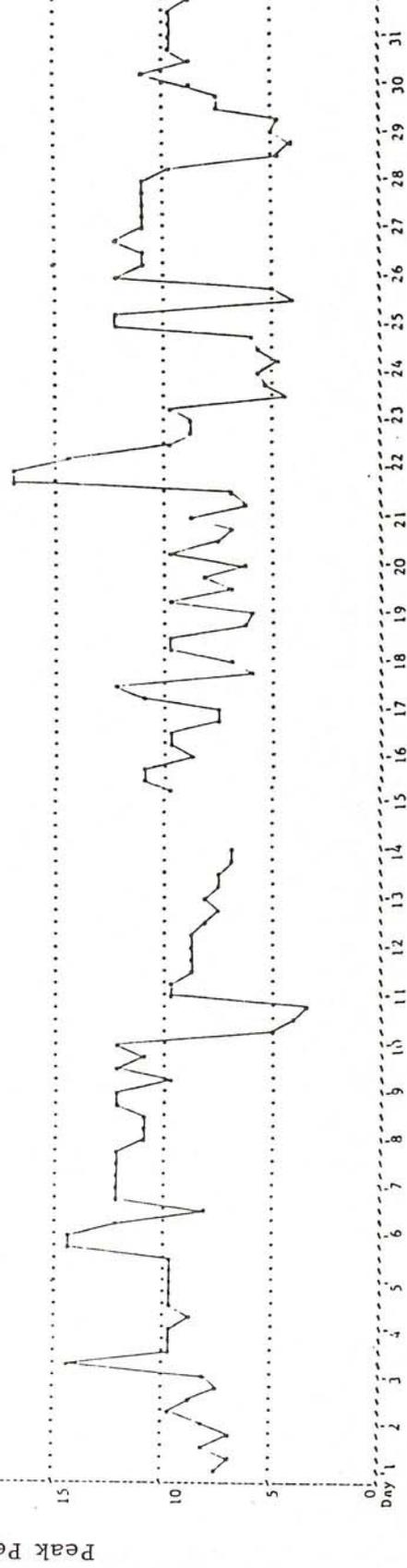


FIGURE 3. Time History of Wave Heights and Periods - July 1985 Part II: Periods

IV. CURRENT DATA

Current data (Table 4) are collected from two Marsh-McBirney electromagnetic biaxial current meters (Table 1 and Figure 2) and by visually observing the movement of dye on the water surface in the surf and at the seaward end of the pier, as well as 500 m updrift of the pier 12 m offshore.

Since the shoreline orientation is approximately $N20^{\circ}W$, alongshore currents flow either toward 340° (i.e. northward) or toward 160° (i.e. southward). Similarly, cross-shore currents are either onshore (westward) or offshore (eastward).

All current speeds are given in centimeters per second.

TABLE 4: CURRENT DATA
(SPEEDS IN CM/SEC)
July 1985

DAY	TIME	PIEK MEASUREMENTS						BEACH MEASUREMENTS (500 UPDRIFT)			CURRENT METER AT SOUTH TIRPOD (DEPTH -4.8m MSL) I.D.#679	
		DYE AT 19400 (579m) (SURFACE)		CURRENT METER AT 14+20(433m) I.D.#639 (DEPTH -4.2m MSL)		DYE AT MID-SURF ZONE (SURFACE) DIST. FROM		DYE 12M OFFSHORE (SURFACE)				
		SPEED	DIR	SPEED	DIR	BASELINE(M)	SPEED	DIR	LOCATION	SPEED	DIR	
1	0100-Alongshore			6	N					10	S	
	Cross-shore			1	OF					1	ON	
	Resultant			6	346					10	165	
1	0700-Alongshore	61	S	3	S		61	S		24	S	
	Cross-shore	0	0	5	ON	128	0	0		10	ON	
	Resultant	61	160	6	215		61	160		25	182	
1	1300-Alongshore			10	S					26	S	
	Cross-shore			3	ON					12	ON	
	Resultant			10	178					29	185	
1	1900-Alongshore			11	S					27	S	
	Cross-shore			8	ON					14	ON	
	Resultant			14	196					31	188	
2	0100-Alongshore			2	S					17	S	
	Cross-shore			0						10	ON	
	Resultant			2	160					19	190	
2	0700-Alongshore	51	S	4	S		87	S	18	S	22	S
	Cross-shore	0	0	2	ON	140	22	W	North	8	ON	
	Resultant	51	160	4	188		90	174		23	180	
2	1300-Alongshore			4	N					11	S	
	Cross-shore			0						1	ON	
	Resultant			4	340					11	164	
2	1900-Alongshore			4	N					9	S	
	Cross-shore			2	ON					6	ON	
	Resultant			5	310					11	191	
3	0100-Alongshore			8	N					1	N	
	Cross-shore			0						1	ON	
	Resultant			8	340					1	303	
3	0700-Alongshore	9	N	8	N		9	N	0	N	9	N
	Cross-shore	7	Off	1	OF	130	2	Off	South	4	OF	
	Resultant	11	17	8	344		9	354		10	4	
3	1300-Alongshore			10	N					5	N	
	Cross-shore			1	OF					8	OF	
	Resultant			10	347					10	37	
3	1900-Alongshore			20	N					10	N	
	Cross-shore			5	OF					8	OF	
	Resultant			21	354					13	21	
4	0100-Alongshore			9	N					4	N	
	Cross-shore			1	OF					3	OF	
	Resultant			9	347					5	18	
4	0700-Alongshore	16	N	10	N		20	N	19	N	9	N
	Cross-shore	8	Off	1	OF	129	0	0	South	4	OF	
	Resultant	17	7	10	343		20	20		10	7	
4	1300-Alongshore			8	N					0		
	Cross-shore			0						0		
	Resultant			8	340					0	0	
4	1900-Alongshore			13	N					10	N	
	Cross-shore			2	OF					6	OF	
	Resultant			13	347					12	10	
5	0100-Alongshore			10	N					6	N	
	Cross-shore			1	OF					2	OF	
	Resultant			10	345					6	358	
5	0700-Alongshore	20	N	11	N		23	N	19	N	9	N
	Cross-shore	5	Off	1	OF	128	6	Off	South	2	OF	
	Resultant	21	354	11	343		24	354		9	352	
5	1300-Alongshore			9	N					0		
	Cross-shore			1	OF					0		
	Resultant			9	345					0	0	
5	1900-Alongshore			18	N					16	N	
	Cross-shore			4	OF					10	OF	
	Resultant			18	351					19	14	
6	0100-Alongshore			13	N					11	N	
	Cross-shore			1	OF					7	OF	
	Resultant			13	346					13	13	
6	0700-Alongshore	25	N	14	N		29	N	21	N	11	N
	Cross-shore	6	Off	1	OF	137	10	Off	South	5	OF	
	Resultant	26	354	14	346		31	359		12	4	
6	1300-Alongshore			10	N					4	N	
	Cross-shore			0						2	OF	
	Resultant			10	340					5	3	
6	1900-Alongshore			18	N					16	N	
	Cross-shore			4	OF					9	OF	
	Resultant			19	351					18	9	

KEY = ALL SPEEDS IN CM/SEC
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S = SOUTHWARD, SHORE PARALLEL
ON = ON SHORE
OF = OFFSHORE

TABLE 4: CURRENT DATA
(SPEEDS IN CM/SEC)

DAY	TIME	PIER MEASUREMENTS						BEACH MEASUREMENTS (500 UPDRIFT)				
		DYE AT 19400 (579m)		CURRENT METER AT 14+20(433m) I.D.#639		DYE AT MID-SURF ZONE (SURFACE) DIST. FROM		DYE 12M OFFSHORE (SURFACE)		CURRENT METER AT SOUTH TRIPOD (DEPTH -4.8m MSL) I.D.#679		
		SPEED	DIR	SPEED	DIR	BASELINE (M)	SPEED	DIR	LOCATION	SPEED	DIR	SPEED
7	0100	Alongshore		12	N						9	N
		Cross-shore		1	OF					1	OF	
		Resultant		12	345					9	348	
7	0700	Alongshore	20	0	11	N		3	S		10	N
		Cross-shore	10	Off	1	OF	134	10	Off	South	8	N
		Resultant	23	110	11	343		11	88		10	351
7	1300	Alongshore			8	N					2	N
		Cross-shore			0						1	OF
		Resultant			8	340					2	23
7	1900	Alongshore			11	N					5	N
		Cross-shore			1	OF					9	OF
		Resultant			11	345					10	43
8	0100	Alongshore			14	N					6	N
		Cross-shore			2	OF					7	OF
		Resultant			14	347					10	30
8	0700	Alongshore	14	N	11	N		0	0		6	N
		Cross-shore	0	0	1	OF	137	0	0	South	0	OF
		Resultant	14	20	11	344		0	0		9	26
8	1300	Alongshore			10	N					6	N
		Cross-shore			1	OF					3	OF
		Resultant			10	343					6	4
8	1900	Alongshore			16	N					4	N
		Cross-shore			3	OF					4	OF
		Resultant			16	349					5	24
9	0100	Alongshore			21	N					5	N
		Cross-shore			4	OF					7	OF
		Resultant			21	350					7	22
9	0700	Alongshore	6	0	8	N		5	N		3	N
		Cross-shore	9	Off	0		137	5	Off	South	5	OF
		Resultant	11	110	8	340		7	28		4	25
9	1300	Alongshore			7	N					2	S
		Cross-shore			1	OF					3	OF
		Resultant			7	345					4	108
9	1900	Alongshore			17	N					7	N
		Cross-shore			3	OF					0	
		Resultant			18	350					7	340
10	0100	Alongshore			10	N					1	N
		Cross-shore			1	OF					5	OF
		Resultant			10	346					5	53
10	0700	Alongshore	2	S	5	N		2	N		3	S
		Cross-shore	4	Off	1	ON	135	3	Off	South	15	OF
		Resultant	5	100	5	330		4	31		3	123
10	1300	Alongshore			3	N					12	S
		Cross-shore			4	ON					6	ON
		Resultant			5	284					13	188
10	1900	Alongshore			9	N					9	S
		Cross-shore			0						6	ON
		Resultant			9	340					11	192
11	0100	Alongshore			9	N					7	N
		Cross-shore			0						2	OF
		Resultant			9	340					7	354
11	0700	Alongshore	30	N	14	N		21	N		7	N
		Cross-shore	8	On	4	OF	132	5	Off	South	35	OF
		Resultant	31	126	15	355		22	354		13	37
11	1300	Alongshore			5	N					1	S
		Cross-shore			1	ON					3	OF
		Resultant			5	333					3	98
11	1900	Alongshore			7	N					5	S
		Cross-shore			3	OF					5	OF
		Resultant			7	4					7	119
12	0100	Alongshore			10	N					1	N
		Cross-shore			3	OF					6	OF
		Resultant			10	355					6	64
12	0700	Alongshore	11	S	4	N		8	N		7	S
		Cross-shore	0	0	3	ON	140	3	Off	South	12	ON
		Resultant	11	160	5	309		9	2		8	181
12	1300	Alongshore			5	N					7	S
		Cross-shore			2	OF					6	OF
		Resultant			5	5					9	120
12	1900	Alongshore			4	N					7	S
		Cross-shore			3	ON					2	ON
		Resultant			5	307					7	179

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 ON = ON SHORE
 OF = OFF SHORE

TABLE 4: CURRENT DATA
(SPEEDS IN CM/SEC)

DAY	TIME	PIER MEASUREMENTS						BEACH MEASUREMENTS (500 YD DRIFT)			
		DYE AT 19+00 (579m)		CURRENT METER AT 14+20 (433m) I.D.#639		DYE AT MID-SURF ZONE (SURFACE) DIST. FROM BASELINE (M)		DYE 12M OFFSHORE (SURFACE)		CURRENT METER AT SOUTH TRIPOD (DEPTH -4.8m MSL) I.D.#679	
		SPEED	DIR	SPEED	DIR	SPEED	DIR	SPEED	DIR	SPEED	DIR
13	0100-Alongshore			8	N					0	
	Cross-shore			0						1	OF
	Resultant			8	340					1	70
13	0700-Alongshore	22	N	4	N		10	N	8	S	
	Cross-shore	5	On	0		140	5	Off	0		
	Resultant	22	326	4	340		11	6	8	160	
13	1300-Alongshore			8	N				6	S	
	Cross-shore			1	OF				1	ON	
	Resultant			8	347				7	171	
13	1900-Alongshore			7	N				5	S	
	Cross-shore			0					3	ON	
	Resultant			7	340				6	191	
14	0100-Alongshore			8	N				1	N	
	Cross-shore			0					2	OF	
	Resultant			8	340				2	40	
14	0700-Alongshore	27	N				21	N			
	Cross-shore	4	Off			137	9	Off	South	37	N
	Resultant	27	349				23	2			
14	1300-Alongshore										
	Cross-shore					Software Crash					
	Resultant					Software Crash					
14	1900-Alongshore										
	Cross-shore										
	Resultant										
15	0100-Alongshore										
	Cross-shore										
	Resultant										
15	0700-Alongshore	20	N	10	N		8	N		34	N
	Cross-shore	8	Off	1	OF	128	4	Off	South		
	Resultant	22	2	11	348		9	7			
15	1300-Alongshore			10	N				6	N	
	Cross-shore			2	OF				2	OF	
	Resultant			11	351				6	359	
15	1900-Alongshore			14	N				11	N	
	Cross-shore			2	OF				5	OF	
	Resultant			14	347				12	6	
16	0100-Alongshore			10	N				7	N	
	Cross-shore			1	OF				2	OF	
	Resultant			10	343				7	358	
16	0700-Alongshore	5	N	7	N		11	N		10	N
	Cross-shore	7	Off	0		140	5	Off	South		
	Resultant	9	36	7	340		12	7			
16	1300-Alongshore			9	N				4	N	
	Cross-shore			1	OF				3	OF	
	Resultant			9	346				5	21	
16	1900-Alongshore			9	N				2	N	
	Cross-shore			0					1	OF	
	Resultant			9	340				3	5	
17	0100-Alongshore			9	N				1	S	
	Cross-shore			1	OF				3	OF	
	Resultant			9	348				3	80	
17	0700-Alongshore	24	S	6	N		15	S		40	N
	Cross-shore	9	On	1	OF	137	6	Off	South		
	Resultant	29	179	6	348		16	138	7	186	
17	1300-Alongshore			12	N				7	N	
	Cross-shore			4	OF				16	OF	
	Resultant			13	360				17	45	
17	1900-Alongshore			8	S				23	S	
	Cross-shore			2	OF				4	ON	
	Resultant			8	145				24	169	
18	0100-Alongshore			6	S				22	S	
	Cross-shore			2	ON				6	ON	
	Resultant			7	182				22	176	
18	0700-Alongshore	76	S	7	S		24	S		40	N
	Cross-shore	0	0	2	ON	140	0	0	South		
	Resultant	76	200	7	177		24	160	12	ON	
18	1300-Alongshore			9	S				25	S	
	Cross-shore			3	ON				11	ON	
	Resultant			10	181				24	187	
18	1900-Alongshore			6	S				22	S	
	Cross-shore			3	ON				13	ON	
	Resultant			6	185				25	191	

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 OF = OFFSHORE

TABLE 4: CURRENT DATA
(SPEEDS IN CM/SEC)

DAY	TIME	PIER MEASUREMENTS						BEACH MEASUREMENTS (500 UPDRIFT)						
		DYE AT 19+00 (579m)		CURRENT METER AT 14+20(433m) I.D.#639		DYE AT MID-SURF ZONE (SURFACE)		DYE 12H OFFSHORE (SURFACE)		CURRENT METER AT SOUTH TRIPOD (DEPTH -4.8m MSL)		I.D.#679		
		SPEED	DIR	SPEED	DIR	SPEED	DIR	BASELINE (M)	SPEED	DIR	LOCATION	SPEED	DIR	SPEED
19	0100			3	S								14	S
				2	ON								10	ON
				4	196								17	195
19	0700	40	S	3	S		47	S		25	N		15	S
		0	0	3	ON	140	0	0	South				8	ON
		40	160	5	201		47	160					16	188
19	1300			8	S								15	S
				2	ON								6	ON
				9	175								16	182
19	1900			1	N								2	N
				2	ON								1	OF
				2	271								3	0
20	0100			4	N								8	S
				2	ON								1	ON
				4	315								8	170
20	0700	14	N	9	N		15	N		10	N		8	N
		24	Off	0		128	2	Off	South				5	OF
		27	60	9	340		15	346					9	10
20	1300			9	N								10	N
				0									4	OF
				9	340								11	1
20	1900			12	N								29	N
				1	OF								7	OF
				12	345								29	353
21	0100			10	N								26	N
				2	OF								4	OF
				10	349								26	349
21	0700	No		10	N								22	N
		Observations		1	OF								5	OF
				10	347								23	352
21	1300			2	N								12	N
				1	OF								1	OF
				2	353								12	344
21	1900			9	N								33	N
				1	OF								9	OF
				10	349								34	356
22	0100			3	N								21	N
				0									2	ON
				3	340								21	334
22	0700	15	N	4	N		16	N		7	N		25	N
		15	Off	1	OF	120	12	Off	South				0	
		21	25	4	354		20	17					25	340
22	1300			3	N								0	
				1	OF								1	ON
				3	355								1	250
22	1900			11	N								13	N
				4	OF								9	OF
				12	1								16	17
23	0100			4	N								3	N
				1	OF								2	OF
				4	358								4	5
23	0700	0	0	5	N		76	N		0	0		4	N
		0	0	2	OF	140	19	Off	South				2	OF
		0	0	5	2		79	354					4	13
23	1300			1	N								11	S
				4	OF								4	OF
				4	59								12	142
23	1900			1	S								16	S
				0									1	ON
				1	160								16	164
24	0100			0									18	S
				1	OF								4	OF
				1	70								18	148
24	0700	11	S	1	N		68	S		36	S		10	S
		1	On	0		152	20	On	North				0	
		11	166	1	340		71	177					10	160
24	1300			2	S								18	S
				2	ON								5	ON
				3	198								19	177
24	1900			1	N								15	S
				0									3	ON
				1	340								15	170

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 OF = OFFSHORE

EIER MEASUREMENTS

BEACH MEASUREMENTS:
(500 M DRIFT)

MAY	TIME	EIER MEASUREMENTS				BEACH MEASUREMENTS				
		DYE AT 19400 (579m) (SURFACE)	CURRENT METER AT 14120(433m) I.D.#639 (DEPTH -4.2m MSL)	DYE AT MID-SURF ZONE (SURFACE) DIST. FROM	CURRENT METER AT SOUTH TRIFOD (DEPTH -4.8m MSL) I.D.#679	DYE 12M OFFSHORE (SURFACE)	CURRENT METER	LOCATION	SPEED	DIR
25	0100	Alongshore	1	S					14	S
		Cross-shore	1	OF					0	
		Resultant	2	111					14	160
25	0700	Alongshore	0	0	1	N			10	S
		Cross-shore	5	On	4	OF	152	17	1	OF
		Resultant	8	197	4	57		34	10	152
25	1300	Alongshore	5	N					1	S
		Cross-shore	3	OF					1	ON
		Resultant	6	8					2	202
25	1900	Alongshore	6	N					6	N
		Cross-shore	3	OF					3	OF
		Resultant	6	7					7	4
26	0100	Alongshore	6	N					10	N
		Cross-shore	3	OF					7	OF
		Resultant	7	6					13	15
26	0700	Alongshore	24	N	5	N			8	N
		Cross-shore	6	Off	2	OF	140	61	4	OF
		Resultant	25	354	6	5		15	9	4
26	1300	Alongshore	4	N					9	N
		Cross-shore	2	OF					2	OF
		Resultant	4	9					10	354
26	1900	Alongshore	3	N					3	N
		Cross-shore	2	OF					1	OF
		Resultant	4	11					3	350
27	0100	Alongshore	4	N					11	N
		Cross-shore	2	OF					5	OF
		Resultant	4	4					12	3
27	0700	Alongshore	10	N	4	N			6	N
		Cross-shore	12	Off	1	OF	152	8	1	OF
		Resultant	16	30	4	0		28	6	346
27	1300	Alongshore	5	N					8	N
		Cross-shore	1	OF					4	OF
		Resultant	5	357					9	7
27	1900	Alongshore	1	N					8	S
		Cross-shore	1	OF					1	OF
		Resultant	2	40					8	150
28	0100	Alongshore	2	N					3	S
		Cross-shore	1	OF					1	OF
		Resultant	2	11					3	134
28	0700	Alongshore	0	0	1	S			9	S
		Cross-shore	0	0	0		140	60	2	OF
		Resultant	0	0	1	160		0	9	150
28	1300	Alongshore	1	N					1	S
		Cross-shore	1	OF					4	ON
		Resultant	1	17					4	229
28	1900	Alongshore	1	S					5	S
		Cross-shore	1	ON					1	ON
		Resultant	1	210					5	174
29	0100	Alongshore	5	S					25	S
		Cross-shore	2	ON					14	ON
		Resultant	5	180					29	189
29	0700	Alongshore	24	S	4	S			15	S
		Cross-shore	5	Off	3	ON	128	6	7	ON
		Resultant	25	149	5	197		0	16	185
29	1300	Alongshore	1	S					13	S
		Cross-shore	0						2	ON
		Resultant	1	160					13	168
29	1900	Alongshore	1	N					5	S
		Cross-shore	1	ON					3	ON
		Resultant	1	301					6	192
30	0100	Alongshore	1	N					3	S
		Cross-shore	0						3	ON
		Resultant	1	340					5	201
30	0700	Alongshore	25	S	2	S			8	S
		Cross-shore	6	Off	2	ON	140	0	2	ON
		Resultant	26	146	3	196		0	9	173
30	1300	Alongshore	1	N					7	S
		Cross-shore	1	OF					2	OF
		Resultant	1	7					7	146
30	1900	Alongshore	2	N					1	S
		Cross-shore	0						2	OF
		Resultant	2	340					2	80
31	0100	Alongshore	2	N					0	
		Cross-shore	1	ON					1	OF
		Resultant	2	315					1	70
31	0700	Alongshore	0	0	3	N			11	S
		Cross-shore	0	0	1	OF	140	34	4	OF
		Resultant	0	0	3	354		25	11	141
31	1300	Alongshore	3	N					8	S
		Cross-shore	0						3	ON
		Resultant	3	340					9	172
31	1900	Alongshore	3	N					0	
		Cross-shore	0						2	OF
		Resultant	3	340					2	70

KEY = ALL SPEEDS IN CM/SEC
 N = NORTHWARD, SHORE PARALLEL
 S = SOUTHWARD, SHORE PARALLEL
 ON = ONSHORE
 OF = OFFSHORE

V. SUPPLEMENTAL OBSERVATIONS

Visual wave direction measurements (Table 5) taken at the seaward end of the pier are made of both the primary wave train (i.e. that having the larger wave heights) and the secondary wave train (which must be clearly distinguishable as a wave train separate from the primary waves) but not surface chop or capillary waves. The direction of the primary wave train just north of the seaward end of the pier is also determined using a Raytheon Marine Pathfinder radar and measuring alignment of the wave crests. The pier axis (considered perpendicular to the beach at the FRF) is orientated 70° east of true north; consequently, wave angles greater than 70° imply the waves were coming from the south side of the pier.

The width of the surf zone (seawardmost breaker position to shoreline) is determined from the pier deck.

Measurements of surface water temperature, density, and visibility are made daily at the seaward end of the FRF pier. A jar along with a thermometer is lowered about .3 m (1 ft) into the water and allowed to remain for at least one minute. The jar is removed, the temperature read and a hydrometer is used to determine the density. A secci disc is used to determine the surface visibility.

TABLE 5
SUPPLEMENTAL OBSERVATIONS
 July 1985

DAY/TIME	WAVE APPROACH ANGLE AT PIER END (° from True N)		RADAR WAVE ANGLE (° from True N)	WIDTH OF SURF ZONE (M)	WATER CHARACTERISTICS AT PIER END			
	PRIMARY	SECONDARY			TEMP (°C)	DENSITY (g/cc)	SECCI VIS (M)	
1	0750	65	50	60	179	21.7	1.0231	0.9
2	0650	60		60	96	21.4	1.0214	1.2
3	0710	110	80		35	21.4	1.0216	0.9
4	0725	100	130		33	22.1	1.0216	2.1
5	0710	90		80	30	21.5	1.0228	1.2
6	0705	100	120	80	40	21.8	1.0228	1.8
7	1000				12	10.5	1.0234	2.7
8	0710	100	120		36	22.4	1.0232	4.2
9	0705	120			29	20.7	1.0234	2.7
10	0715	110			26	22.0	1.0232	3.3
11	0515	120			38	23.2	1.0225	4.9
12	0705	100			41	24.2	1.0226	5.2
13	0730	80			21	24.3	1.0226	5.5
14	0805	110			38	24.7	1.0226	6.1
15	0630	80			6	21.2	1.0238	4.6
16	0730	80			6	19.0	1.0242	3.6
17	0800	85		80	64	21.3	1.0243	3.6
18	0711	80	60	80	161	23.5	1.0204	1.2
19	0745	85	60		62	24.5	1.0197	1.5
20	0855				33	24.2	1.0222	1.8
21	No observations							
22	0750	125			16	20.3	1.0237	3.6
23	0705	90			52	20.6	1.0241	3.0
24	0700	50		50	146	22.9	1.0234	1.2
25	0700	85	90	80	63	24.4	1.0223	3.0
26	0805	120			51	24.7	1.0226	1.8
27	0920	110		80	44	20.7	1.0239	4.0
28	0815	90	40		43	20.7	1.0241	5.2
29	0705	90			17	23.2	1.0210	4.9
30	0745	100			12	23.2	1.0222	7.9
31	0720	100			52	23.8	1.0220	5.8

VI. WATER LEVELS

The National Ocean Services (NOS) has established a primary tide station (No. 865-1370) at the seaward end of the FRF pier. A Leupold-Stevens digital recording float-type tide gage is used to collect data every 6 minutes throughout the month.

Figure 4 shows the range of each cycle while Figure 5 shows the variation in mean water levels computed over a tidal cycle period (12.42 hours), and contains a list of selected mean and extreme values. This presentation is useful in identifying effects on both meteorological and astronomical forces on the open coast water levels.

Table 6 contains the time of the center of each sampling interval and the range, high, low, and mean water levels during each tidal cycle.

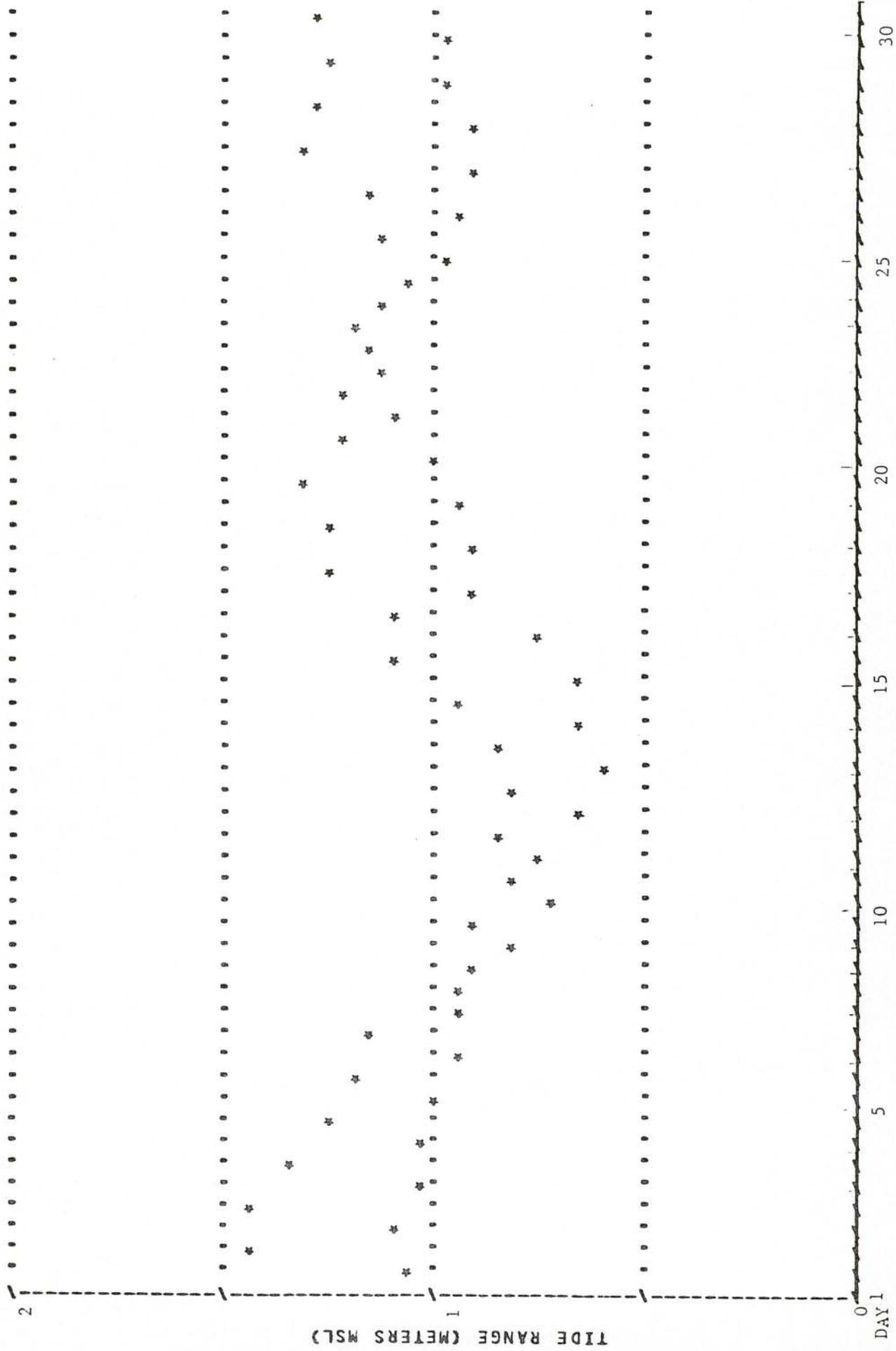


FIGURE 4. Time History of Tide Range, July 1985 (Gage No. 865-1370)

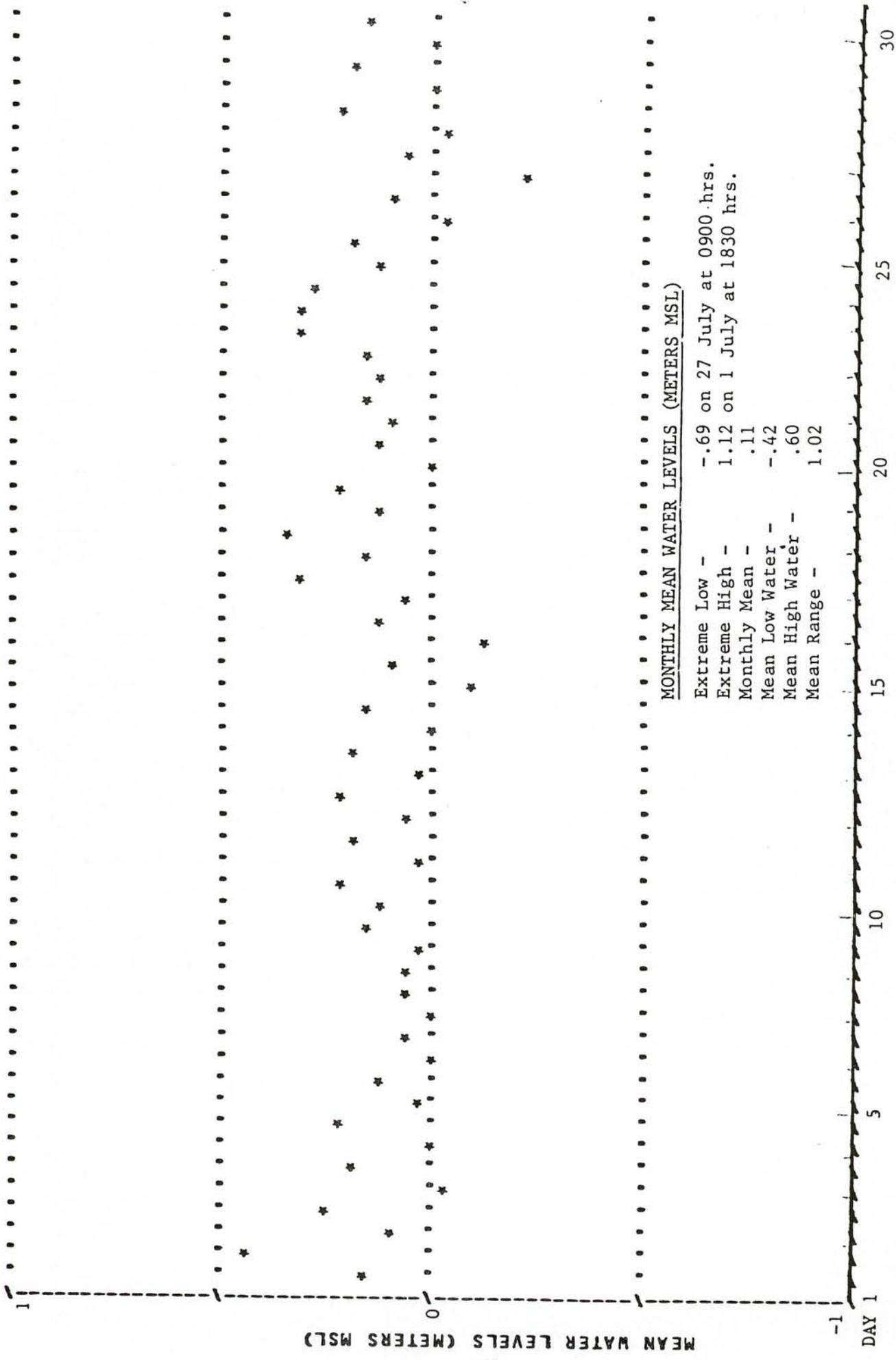


FIGURE 5. Time History of Mean Water Levels, July 1985 (Gage No. 865-1370)

MID-CYCLE DAY	TIME	LOW	HIGH	MEAN	RANGE
1	612	-.35	.70	-.16	1.06
1	1837	-.33	1.12	-.45	1.45
2	702	-.46	.62	-.11	1.08
2	1928	-.50	.93	-.27	1.43
3	753	-.52	.52	-.02	1.05
3	2018	-.50	.83	-.19	1.33
4	843	-.52	.53	-.01	1.05
4	2108	-.46	.79	-.20	1.25
5	934	-.45	.54	-.04	.99
5	2159	-.50	.69	-.13	1.19
6	1024	-.48	.46	-.01	.94
6	2249	-.56	.59	-.05	1.15
7	1114	-.53	.41	-.01	.94
7	2340	-.41	.51	-.07	.92
8	1205	-.40	.49	-.07	.89
9	30	-.38	.42	-.03	.81
9	1255	-.34	.55	-.15	.90
10	120	-.23	.48	-.13	.70
10	1346	-.23	.59	-.22	.81
11	211	-.35	.38	-.02	.74
11	1436	-.29	.55	-.17	.85
12	301	-.26	.39	-.06	.65
12	1526	-.23	.60	-.22	.83
13	352	-.26	.33	-.04	.59
13	1617	-.24	.62	-.20	.86
14	442	-.33	.33	-.00	.66
14	1707	-.36	.59	-.14	.95
15	532	-.44	.23	-.09	.67
15	1758	-.52	.56	-.08	1.08
16	623	-.48	.27	-.13	.75
16	1848	-.44	.66	-.14	1.10
17	713	-.40	.50	-.06	.90
17	1938	-.35	.90	-.32	1.24
18	804	-.29	.62	-.15	.91
18	2029	-.34	.91	-.34	1.25
19	854	-.35	.60	-.11	.95
19	2119	-.48	.84	-.23	1.32
20	944	-.50	.52	-.00	1.01
20	2210	-.49	.73	-.13	1.22
21	1035	-.45	.64	-.09	1.09
21	2300	-.49	.73	-.15	1.22
22	1125	-.43	.68	-.14	1.11
22	2350	-.42	.75	-.16	1.17
23	1216	-.35	.83	-.31	1.18
24	41	-.29	.82	-.31	1.11
24	1306	-.27	.81	-.28	1.07
25	131	-.37	.59	-.12	.96
25	1356	-.37	.74	-.20	1.12
26	222	-.55	.40	-.04	.95
26	1447	-.52	.65	-.09	1.17
27	312	-.69	.23	-.22	.91
27	1537	-.66	.66	-.07	1.32
28	402	-.48	.42	-.02	.89
28	1628	-.48	.81	-.21	1.29
29	453	-.49	.47	-.00	.96
29	1718	-.46	.80	-.19	1.26
30	543	-.47	.50	-.01	.98
30	1808	-.53	.74	-.15	1.27
31	634	-.53	.43	-.05	.96

TABLE 6

WATER LEVELS (METERS MSL)
Tidal Characteristics
July 1985

VII. NEARSHORE PROFILES

A. Nearshore Profiles. In order to document profile response away from the pier, surveys of four profile lines extending 900 to 1,000 m from shore and located 489 and 581 m north and 517 and 608 m south of the FRF pier are conducted bi-weekly, after storms, and during more complete bathymetric surveys.

These profiles are obtained using the CRAB-Zeiss surveying system; a Zeiss Elta-2 first-order, self-recording electronic theodolite distance meter in combination with the Coastal Research Amphibious Buggy (CRAB), a 10.7 m high, self-powered, mobile tripod on wheels.

Figure 6 shows the last survey in June and the two surveys taken during July on profile line 188, located 517 m south of the pier. The two surveys in July show the development of a nearshore bar (120 to 160 m) from the featureless slope present during the June survey. No changes are visible on the remainder of the profile with the exception of a small depression created on the seaward slope (360 m) of the the offshore bar.

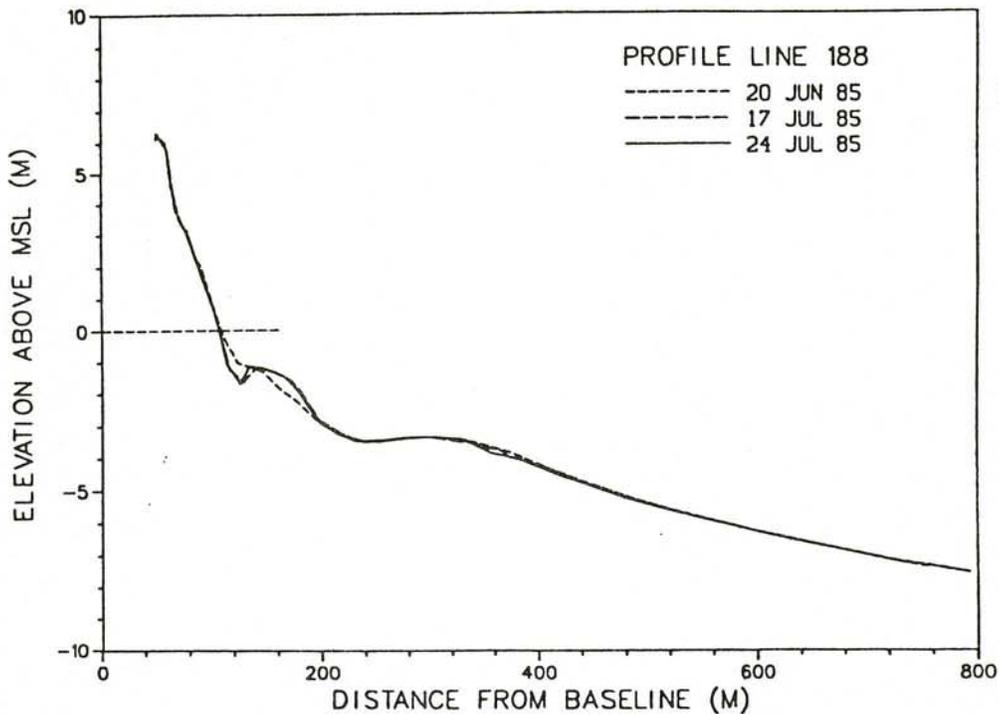


Figure 6. Monthly CRAB profiles on profile 188 - 517 meters south of pier.

The profile envelope (Figure 7) reflects the maximum changes which occurred on the profile between January and July. No changes occurred to the envelope during July.

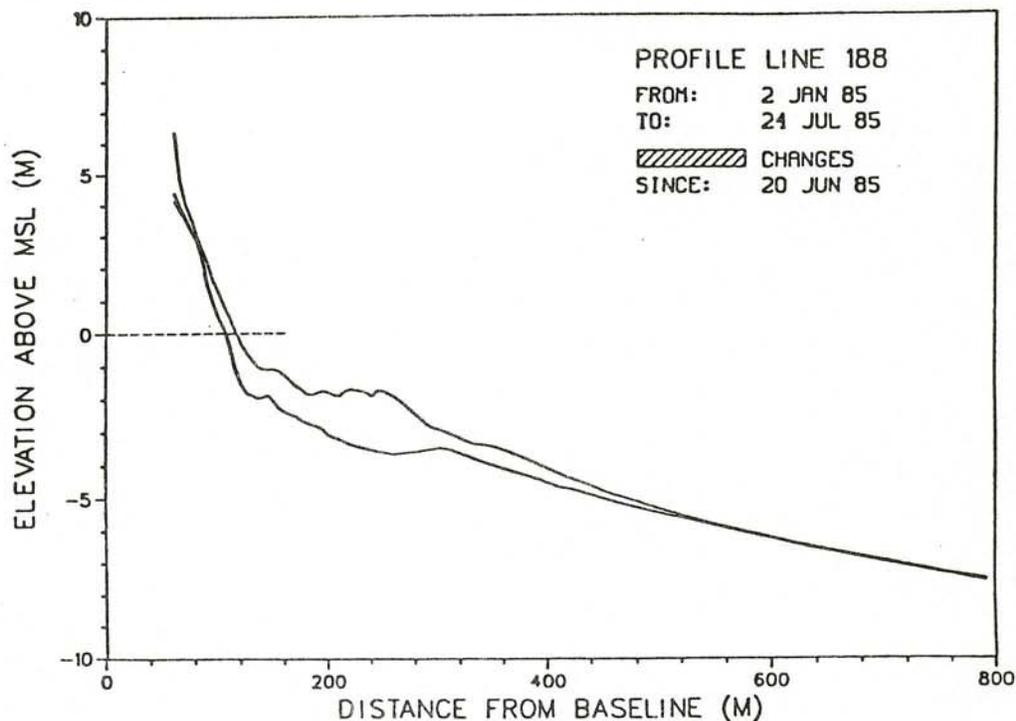


Figure 7. CRAB profile envelope - profile 188.

B. Bathymetry. Figure 8 shows the bathymetry at the FRF after the survey was completed on 15 July. The predominantly southerly waves during the month produced an asymmetric trough under the pier which elongates toward the north. A secondary, shallow trough originating 400 m north of the pier is also present, as can be seen from the contours (1.5, 3.0, 3.5, and 4.0 m) which bend seaward. This secondary trough has been seen before during this time of the year. It generally reflects an interruption of the alongshore sediment flow due to reduced wave energy in the lee of the pier.

Since the previous survey was on 23 April 1985, changes in the bathymetry may be difficult to interpret. However, substantial accretion (up to 1.25 m) occurred landward of 250 m both under the pier and from 250 to 550 m north of the pier. Also, erosion at the shore line centered at 150 m was measured up to 350 m south of the pier.

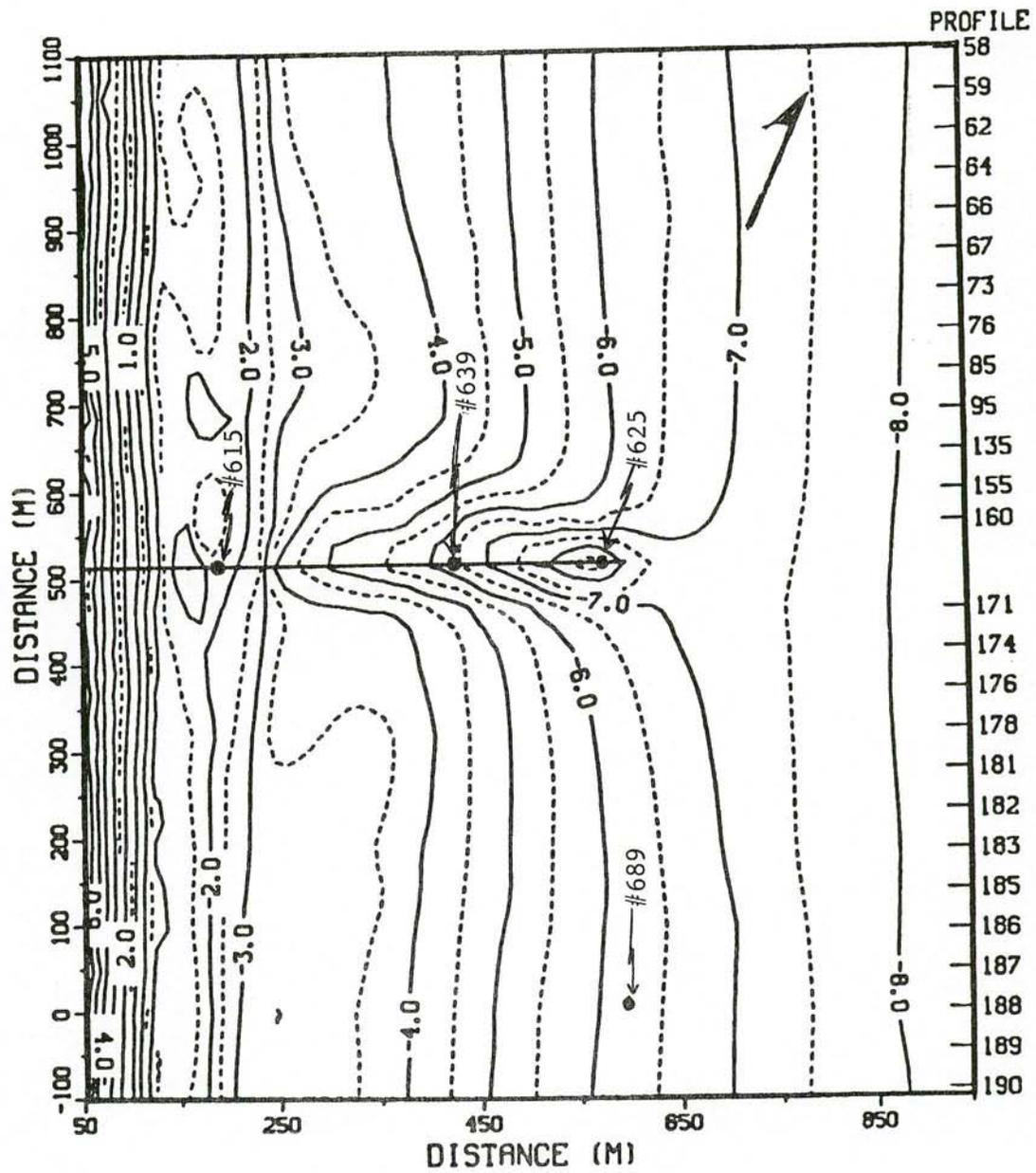


FIGURE 8. FRF BATHYMETRY 15 JUL 85
CONTOURS IN METERS

Distribution List

Government Agencies:

OCE
BERH
NAO
NASA/Wallops Flight Center
NOAA (NOS, NWS)
SAD
SAW

U.S. Geological Survey
U.S. National Park Service
U.S. Naval Academy
U.S. Naval Civil Eng. Lab
U.S. Naval Facilities Eng. Com.
U.S. Naval Research Lab

Colleges/Universities:

California Inst. of Tech.
Duke University
East Carolina University
Florida Inst. of Tech.
NC State University
Old Dominion University
Oregon State University
Prince George's College
Rutgers University
Scripps Inst. of Oceanography

Stockton State College
Texas A&M University
University of Akron
University of Delaware
University of Florida
University of Maryland
University of North Carolina
University of Northern Colorado
University of Rhode Island
University of Virginia
Virginia Inst. of Marine Science

Others:

City of Va. Beach, VA
Coastal Barge Corporation
Coastal and Est. Res., Inc.
Coastal Science & Eng., Inc.
Dr. Galvin
GEOMET, Inc.
Greenhorne & O'Mara, Inc.
Dr. Hylton
Ms. Johnson
Mary Marr, Inc.
Masonite Corporation

Moffatt & Nichol, Eng.
Offshore Coastal Technologies
Mr. Rowland
Mr. Savage
Sea Port Supply Corp.
Shell Development
Sohio Petroleum Co.
Mr. & Mrs. Valpey
WCTI-TV

Foreign:

W. F. Baird & Asso. Coastal Engineers, Ltd (Canada)
Ministry of Construction, Coastal Division (Japan)
Norwegian Hydrodynamic Laboratories (Norway)
University of New South Wales (Australia)
University of Sydney (Australia)